Biology – Course Overview

FIRST QUARTER

I. The Science of Life – Introduction
- A. Characteristics of Living Things
- B. Science Methods used in Life Sciences
- C. The Tools of Biology

II. Chemistry
- A. Atomic Structure
- B. Bonding (Ionic, Covalent, Hydrogen)
- C. Properties of Water
- D. Acids and Bases; pH

III. Biochemistry – Four Basic Molecules in Living Systems
- A. Carbohydrates
- B. Lipids
- C. Protein/Enzymes
- D. Nucleic Acid
- E. Minerals
- F. Vitamins
- G. Cells exist in a narrow range of conditions (temperature, pH)

BIOLOGICAL MOLECULES BENCHMARK

END OF FIRST QUARTER

SECOND QUARTER

IV. Cell Biology
- A. History (…including the Cell Theory)
- B. Cell Structure and Function
- C. Diversity (Specialization) of Cells
- D. Roles of Systems (Excretory, Circulatory, Skeletal/Muscular, Endocrine, Nervous/Sensory)

V. Cell Transport
- A. Cell Membrane Structure
- B. Passive Transport (Diffusion and Osmosis)
- C. Active Transport (Endocytosis and Exocytosis)
- D. Maintaining Homeostasis

VI. Cell Reproduction
- A. Chromosomes (Karyotypes)
- B. The Cell Cycle
- C. Mitosis

CELLS AND ORGANISMS BENCHMARK

END OF FIRST SEMESTER

THIRD QUARTER

VII. DNA and Protein Synthesis
- A. Structure of DNA, RNA, and Protein
- B. Replication, Transcription, and Translation
- C. Gene Mutations

VIII. Genetics
- A. History (including Mendel's Three Principles)
- B. Meiosis
- C. Fertilization
- D. Analyzing Genetic Crosses
  1. Monohybrid
  2. Sex-linked
- E. Human Genetics
  1. Pedigrees
  2. Analyzing Karyotypes
  3. Chromosomal Mutations

IX. Genetic Engineering
- A. DNA Electrophoresis
- B. Recombinant DNA
- C. Cloning

INHERITANCE OF TRAITS BENCHMARK

END OF THIRD QUARTER

FOURTH QUARTER

X. Evolution
- A. History (including Darwin's Theory of Natural Selection)
- B. Artificial and Natural Selection
- C. Adaptation
- D. Variation
- E. Evolutionary Relationships (Anatomical similarities/Embryological & Biochemical comparisons - DNA & Amino Acid Sequences & Analyzing Results From Gel Electrophoresis)

XI. Classification
- A. History of Taxonomy
- B. Linnaeus and Binomial Nomenclature
- C. Modern Classification (Three Domains and Six Kingdoms)

XII. Ecology
- A. Abiotic/Biotic Factors
- B. Biotic Relationships (Predator-Prey, Parasite-Host, Mutualism, Commensalism, Competition)
- C. Transfer of Energy (Producers, Consumers, Trophic Levels)
- D. Succession
- E. Biogeochemical Cycles (Water, Nitrogen, and Carbon) - Photosynthesis & Cellular Respiration (ATP) {Snail and Elodea with Bromthymol Blue}
- F. Factors Influencing Populations (Urbanization/Population Increase, Pollution, Natural Disasters, Disease, Food Depletion, Destruction of Habitats)

EVOLUTION AND INTERDEPENDENCE OF ORGANISMS BENCHMARK

END OF SECOND SEMESTER